SOMAR INTERNATIONAL LTD. 01/02/2007
TEST REPORT

OUTLINE TEST SCENARIO

A comparative test was initiated to evaluate the performance of the existing 400W metal halide fittings, Powerboss Eluma Intelligent Lighting (4x55W) and a branded T5 luminaire (4x55W).

It was proposed that the Eluma and T5 fittings were installed in one area within the facility and metering be undertaken to compare the relative kW usage of these fittings and the comparative light levels delivered over approximately a week of operation.

The mounting height of the test area was 6.6m and 7.2m and in an area where some ambient daylight was present.

TEST / AUDIT PROCEDURE

Prior to commencement of the test, light levels were taken with the existing metal halide fittings still in use using a calibrated Minolta T10 light meter.

4 x Powerboss Eluma luminaire were installed and again light levels taken.

The usage of these fittings was logged using a Circutor AR5L data logger.

As the light levels delivered by Powerboss Eluma were higher than from the existing (and subsequently the T5) fittings, using the programmable nature of the integral sensor, a maximum lux level equivalent to the other solutions was set and energy usage readings taken in order to give a true “like-for-like” illustration.

This therefore provided two sets of data for Eluma; one (peaking at 230W per Eluma) providing higher light levels than both the metal halide and T5 solutions and the other (peaking at 160W per Eluma) providing an equivalent “like-for-like” scenario.

At the end of the test period, these fittings were replaced with 3 x T5 fittings and 1 x metal halide. Again light levels were taken and energy usage data logged. Unfortunately, one T5 fitting was faulty, with only 2 out of 4 lamps working; hence the usage shown on the attached graph.

In all cases, “daylight only” readings were also taken as a control.

TEST RESULTS

The attached sheets detail:

1. Energy usage of the Powerboss Eluma Luminaires
2. Energy usage of the Branded T5 Luminaires
3. Comparative energy usage of the three solutions with projected savings over 1, 3, 5 and 10 year periods.
4. Comparative running cost of the three solutions with projected savings over 1, 3, 5 and 10 year periods.
5. Comparative CO2 emissions of the three solutions with projected savings over 1, 3, 5 and 10 year periods.
6. Comparative light readings the three solutions.

In each of the above usage/emissions examples, data is also shown for the Eluma solution “capped” at a maximum usage of 160W and hence light output equivalent to the other two scenarios.

ASSUMPTIONS

Calculations are based on the following:

1. Energy rate of £0.07 p/kWh plus 0.43p p/kWh CCL.
2. Burning hours are based on 24 hours/ 7 days per week.
3. Connected load of 400W metal halide as 450W.

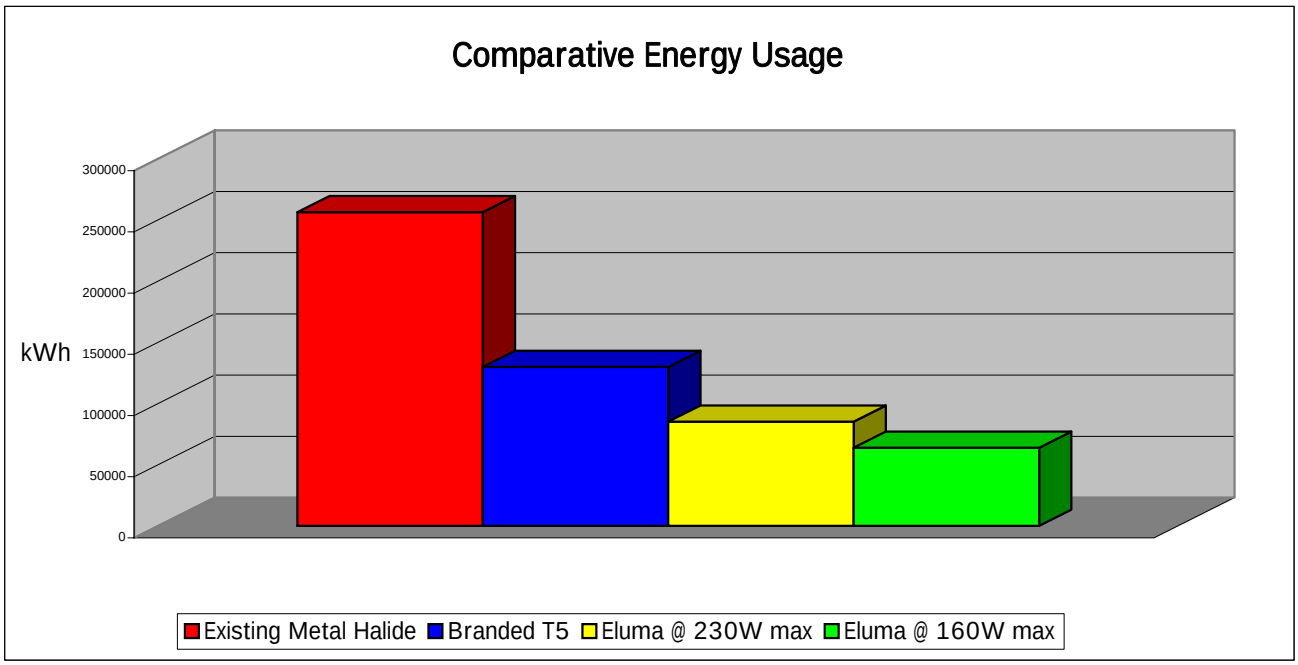
OTHER ELUMA OBSERVATIONS

The test area was at between 6m and 7m in mounting heights. The majority of the site is at over 9m and the additional efficiency of Eluma will become increasingly significant at these mounting heights over the two compared solutions.

The test was under taken within the production area of the facility. Occupancy benefits would be magnified within the warehouse areas of the site and additional usage savings delivered.

The test was carried out in January and hence daylight dimming benefits would also be greater during the longer days of the rest of the year; hence some additional daylight benefits would be delivered.

ENERGY USAGE COMPARISON

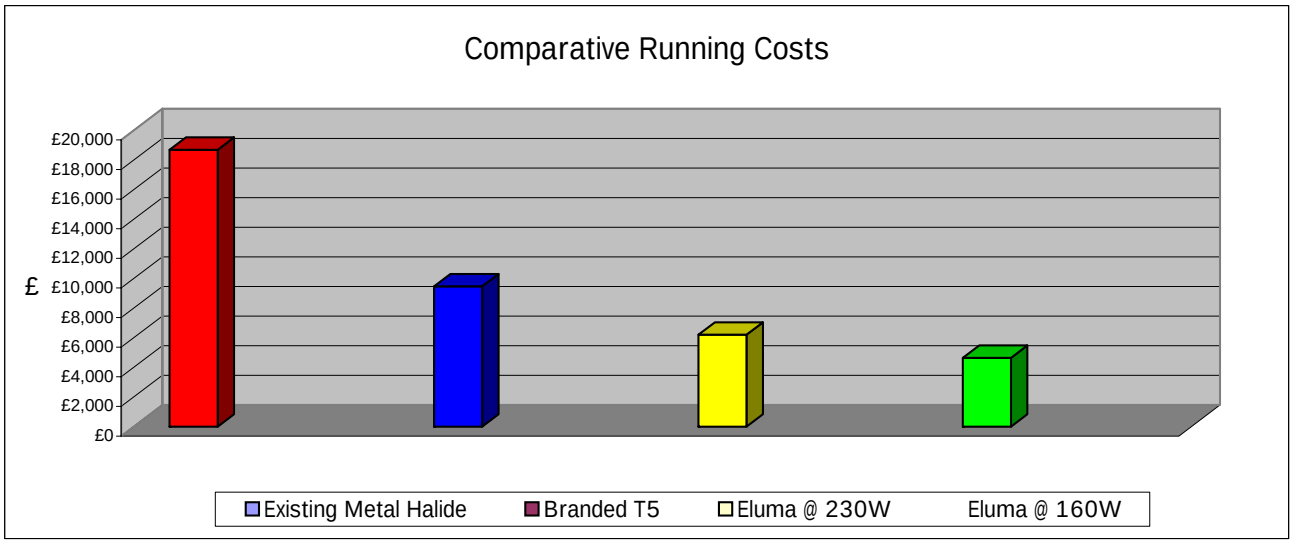


Annual Energy Usage - Existing Installation	256183	kWh	% Saving
Annual Energy Usage - Branded T5	129799	kWh	49%
Annual Energy Usage - Eluma @ 230W Max	85110	kWh	67%
Annual Energy Usage - Eluma @ 160W Max	63761	kWh	75%

PROJECTED ENERGY SAVINGS

	1 year		3 years		5 years		10 years	
Branded T5 @ 230W	126384	kWh	379151	kWh	631918.6	kWh	1263837	kWh
Eluma @ 230W max	171073	kWh	513220	kWh	855367.2	kWh	1710734	kWh
Eluma @ 160W max	192422	kWh	577266	kWh	962110.2	kWh	1924220	kWh

FINANCIAL BENEFITS COMPARISON

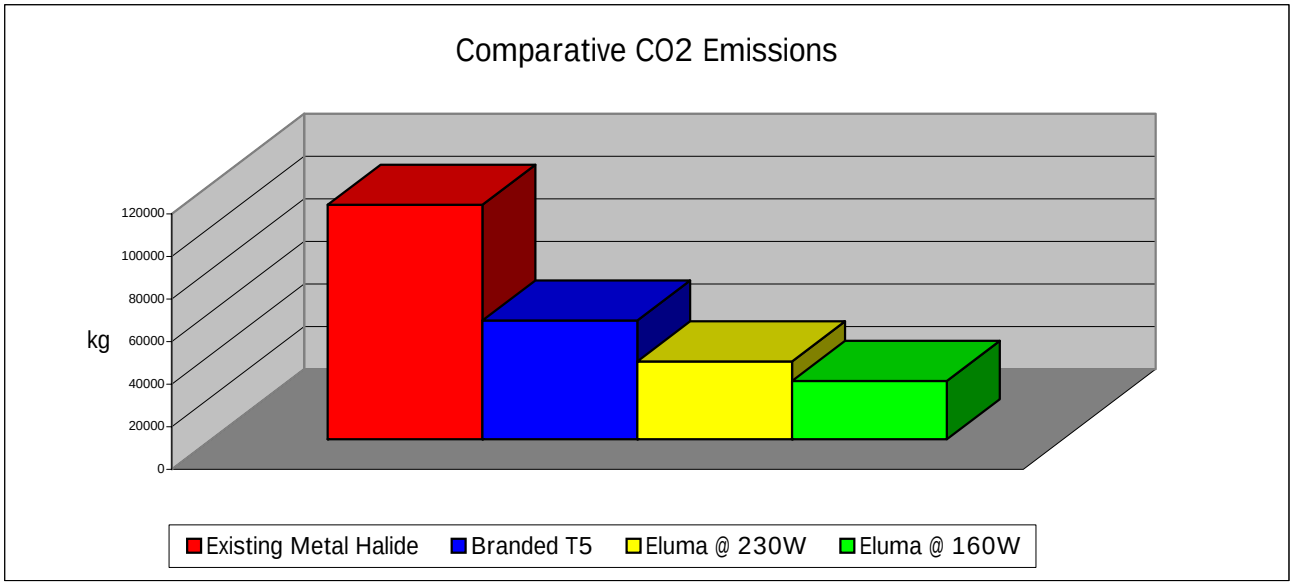


Annual Running Costs - Existing Installation	£18,701	% Saving
Annual Running Costs - Branded T5	£9,475	49%
Annual Running Costs - Eluma @ 230W Max	£6,213	67%
Annual Running Costs - Eluma @ 160W Max	£4,655	75%

PROJECTED ENERGY SAVINGS

	1 year	3 years	5 years	10 years
Branded T5 @ 230W	£9,226	£27,678	£46,130	£92,260
Eluma @ 230W max	£12,488	£37,465	£62,442	£124,884
Eluma @ 160W max	£14,047	£42,140	£70,234	£140,468

ENVIRONMENTAL, HEALTH & SAFETY BENEFITS



Annual CO2 Emissions - Existing Installation	110159	kg	% Saving
Annual CO2 Emissions - Branded T5	55814	kg	49%
Annual CO2 Emissions - Eluma @ 230W Max	36597	kg	67%
Annual CO2 Emissions - Eluma @ 160W Max	27417	kg	75%

PROJECTED CO2 EMISSION SAVINGS

	1 year		3 years		5 years		10 years	
Branded T5 @ 230W	54345	kg	163035	kg	271725	kg	543450	kg
Eluma @ 230W max	73562	kg	220685	kg	367807.9	kg	735615.8	kg
Eluma @ 160W max	82741	kg	248224	kg	413707.4	kg	827414.8	kg

LIGHTING TEST ANALYSIS **DATE:** 01/02/2007

EXISTING METAL HALIDE INSTALLATION

Facility Area	Burning Hours per Day	Burning Days per week	Existing Fittings	Existing Connected Load per fitting (W)	No. of fittings	Total Existing Connected Load (kW)	Total existing kWh p.a.	Existing Maintenance Cost (Lamps/ Labour)	Total Running Cost £ p.a. existing fittings
Production Area	17	7	Metal Halide	450	92	41.40	256183		£ 18,701

BRANDED T5 FITTING

Facility Area	Burning Hours per Day	Burning Days per week	Proposed Fitting	Connected Load per T5 Fitting (W)	Proposed No. of T5 fittings	Total Proposed Connected Load with T5 Fitting (kW)	Total Proposed kWh p.a with T5 Fitting	Maintenance Cost T5 (Lamps/ Labour)	Total Running Cost £ p.a. proposed T5 Fitting
Production Area	17	7	T5 4 x 55W	228	92	20.976	129799		£ 9,475

ELUMA SOLUTION @ 230W MAX

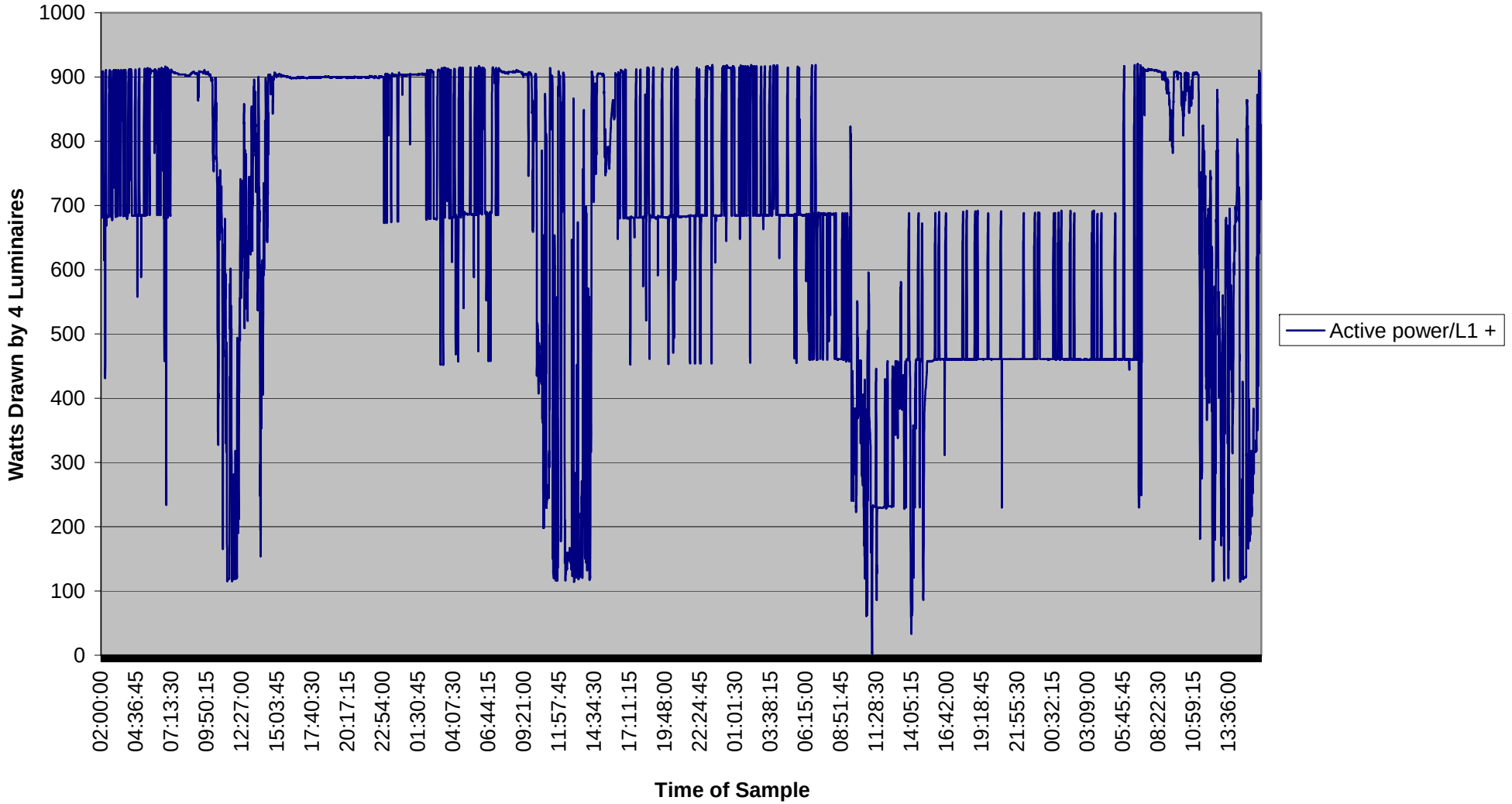
Facility Area	Burning Hours per Day	Burning Days per week	Proposed Fitting	Connected Load per Eluma (W)	Proposed No. of Eluma fittings	Total Proposed Connected Load with Eluma (kW)	% Saving Benefit from Occupancy / Daylight sensing	Total Proposed kWh p.a with Eluma	Maintenance Cost Eluma (Lamps/ Labour)	Total Running Cost £ p.a. proposed Eluma solution
Production Area	17	7	Eluma 4x55W	230	92	21.16	35	85110		£ 6,213

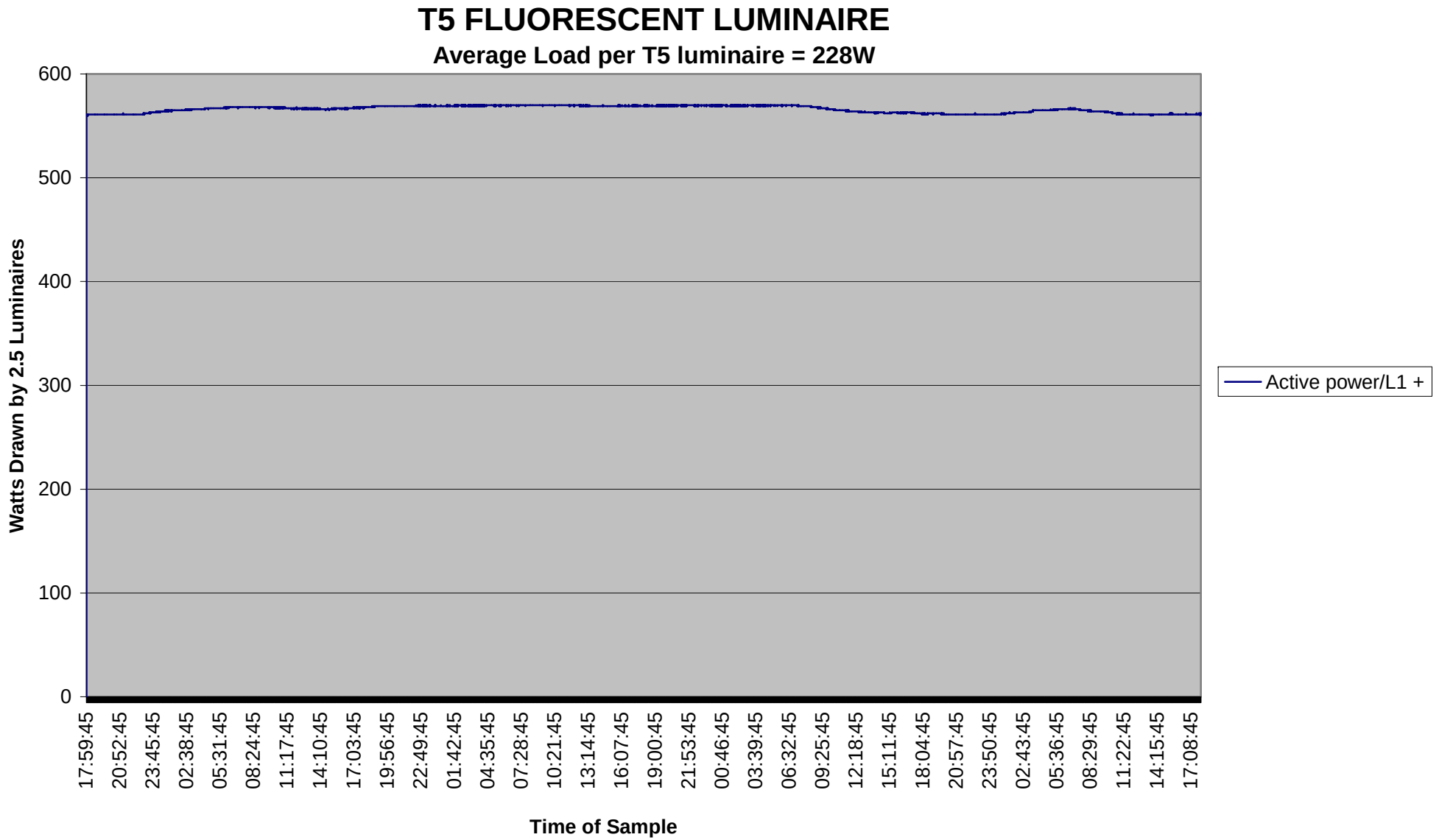
ELUMA SOLUTION @ 160W MAX

Facility Area	Burning Hours per Day	Burning Days per week	Proposed Fitting	Connected Load per Eluma (W)	Proposed No. of Eluma fittings	Total Proposed Connected Load with Eluma (kW)	% Saving Benefit from Occupancy / Daylight sensing	Total Proposed kWh p.a with Eluma	Maintenance Cost Eluma (Lamps/ Labour)	Total Running Cost £ p.a. proposed Eluma solution
Production Area	17	7	Eluma 4x55W	160	92	14.72	30	63761		£ 4,655

POWERBOSS ELUMA LUMINAIRE

Average Load per Eluma = 148W




T5 FLUORESCENT LUMINAIRE
Average Load per T5 luminaire = 228W
Watts Drawn by 2.5 Luminaires
600
500
400
300
200
100
0
17:59:45
20:52:45
23:45:45
02:38:45
05:31:45
08:24:45
11:17:45
14:10:45
17:03:45
19:56:45
22:49:45
01:42:45
04:35:45
07:28:45
10:21:45
13:14:45
16:07:45
19:00:45
21:53:45
00:46:45
03:39:45
06:32:45
09:25:45
12:18:45
15:11:45
18:04:45
20:57:45
23:50:45
02:43:45
05:36:45
08:29:45
11:22:45
14:15:45
17:08:45
Time of Sample
Active power/L1 +

COMPARATIVE LIGHT LEVELS

FITTING	LIGHT LEVELS TAKEN INCLUDING STANDARDISED DAYLIGHT CONTRIBUTION			AVERAGE LIGHT LEVELS WITH DAYLIGHT CONTRIBUTION REMOVED
	Min (lx)	Ave (lx)	Max (lx)	Ave (lx)
Existing Metal Halide (@ 450W constant)	180	300	350	220
Eluma (@230W max)	250	575	650	375
Eluma (@160W max)	190	380	420	240
Branded T5 (@ 230W contstant)	150	370	430	230

Daylight Contribution at times of testing:

Metal Halide	180lx average, 120lx min, 240lx max.
Eluma	180lx average, 120lx min, 240lx max.
Branded T5	240lx average, 130lx min, 330lx max.

Lux readings taken using Calibrated Minolta T-10 Light Meter*

* Calibration date - October 2006